

CLAIMS

1. Ready-to-use composition for the oxidation dyeing of keratinous fibres, and in particular human keratinous fibres such as hair,  
5 characterized in that it comprises, in a medium appropriate for dyeing:
  - at least one oxidation base,
  - 2-amino-4-N-( $\beta$ -hydroxyethyl)aminoanisole and/or at least one of its addition salts with an acid as  
10 coupler,
  - at least one enzyme of the laccase type.
2. Composition according to Claim 1, characterized in that the laccase is chosen from laccases of plant origin, animal origin, fungal origin  
15 or bacterial origin and from the laccases obtained by biotechnology.
3. Composition according to either of Claims 1 and 2, characterized in that the laccase is of plant origin and chosen from the laccases present in  
20 the extracts of Anacardiaceae, Podocarpaceae, Rosmarinus off., Solanum tuberosum, Iris sp., Coffea sp., Daucus carota, Vinca minor, Persea americana, Catharethus roseus, Musa sp., Malus pumila, Ginkgo biloba, Monotropa hypopithys (Indian pipe), Aesculus  
25 sp., Acer pseudoplatanus, Prunus persica and Pistacia palaestina.

4. Composition according to Claim 1 or 2, characterized in that the laccase is of fungal origin or obtained by biotechnology.

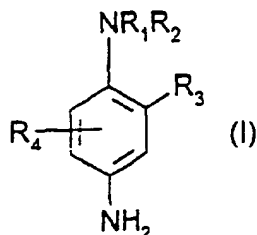
5. Composition according to Claim 4,  
5 characterized in that the laccase is chosen from the laccases derived from Polyporus versicolor, Rhizoctonia praticola, Rhus vernicifera, Scytalidium, Polyporus pinsitus, Myceliophthora thermophila, Rhizoctonia solani, Pyricularia orizae, Trametes versicolor, Fomes  
10 fomentarius, Chaetomium thermophile, Neurospora crassa, Colorius versicol, Botrytis cinerea, Rigidoporus lignosus, Phellinus noxius, Pleurotus ostreatus, Aspergillus nidulans, Podospora anserina, Agaricus bisporus, Ganoderma lucidum, Glomerella cingulata,  
15 Lactarius piperatus, Russula delica, Heterobasidion annosum, Thelephora terrestris, Cladosporium cladosporioides, Cerrena unicolor, Coriolus hirsutus, Ceriporiopsis subvermispora, Coprinus cinereus, Panaeolus papilionaceus, Panaeolus sphinctrinus,  
20 Schizophyllum commune, Dichomitius squalens, and of variants thereof.

6. Composition according to any one of the preceding claims, characterized in that the quantity of laccase(s) is between 0.5 and 200 Lacu per 100 g of  
25 dyeing composition.

7. Composition according to any one of the preceding claims, characterized in that the oxidation base(s) are chosen from para-phenylenediamines, double

bases, para-aminophenols, ortho-aminophenols and heterocyclic oxidation bases.

8. Composition according to Claim 7, characterized in that the para-phenylenediamines are  
 5 chosen from the compounds of formula (I), and their addition salts with an acid:



in which:

- R<sub>1</sub> represents a hydrogen atom, a C<sub>1</sub>-C<sub>4</sub> alkyl radical,  
 10 a monohydroxy(C<sub>1</sub>-C<sub>4</sub> alkyl) radical, a polyhydroxy-(C<sub>2</sub>-C<sub>4</sub> alkyl) radical, a (C<sub>1</sub>-C<sub>4</sub>)alkoxy(C<sub>1</sub>-C<sub>4</sub>)alkyl radical, a C<sub>1</sub>-C<sub>4</sub> alkyl radical substituted with a nitrogen-containing group, a phenyl radical or a 4'-aminophenyl radical;
- 15 - R<sub>2</sub> represents a hydrogen atom, a C<sub>1</sub>-C<sub>4</sub> alkyl radical, a monohydroxy(C<sub>1</sub>-C<sub>4</sub> alkyl) radical, a polyhydroxy(C<sub>2</sub>-C<sub>4</sub> alkyl) radical, a (C<sub>1</sub>-C<sub>4</sub>)alkoxy(C<sub>1</sub>-C<sub>4</sub>)alkyl radical or a C<sub>1</sub>-C<sub>4</sub> alkyl radical substituted with a nitrogen-containing group;
- 20 - R<sub>3</sub> represents a hydrogen atom, a halogen atom such as a chlorine, bromine, iodine or fluorine atom, a C<sub>1</sub>-C<sub>4</sub> alkyl radical, a monohydroxy(C<sub>1</sub>-C<sub>4</sub> alkyl) radical, a hydroxy(C<sub>1</sub>-C<sub>4</sub> alkoxy) radical, an acetylamino(C<sub>1</sub>-C<sub>4</sub>

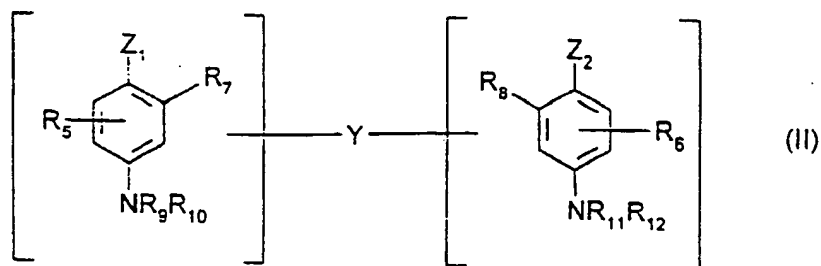
alkoxy) radical, a mesylamino( $C_1-C_4$  alkoxy) radical  
or a carbamoylamino( $C_1-C_4$  alkoxy) radical,

- $R_4$  represents a hydrogen or halogen atom or a  $C_1-C_4$  alkyl radical.

- 5                    9.    Composition according to Claim 8,  
characterized in that the para-phenylenediamines of  
formula (I) are chosen from para-phenylenediamine,  
para-tolylenediamine, 2-chloro-para-phenylenediamine,  
2,3-dimethyl-para-phenylenediamine, 2,6-dimethyl-para-  
10 phenylenediamine, 2,6-diethyl-para-phenylenediamine,  
2,5-dimethyl-para-phenylenediamine, N,N-dimethyl-para-  
phenylenediamine, N,N-diethyl-para-phenylenediamine,  
N,N-dipropyl-para-phenylenediamine, 4-amino-N,N-  
diethyl-3-methylaniline, N,N-bis( $\beta$ -hydroxyethyl)-para-  
15 phenylenediamine, 4-N,N-bis( $\beta$ -hydroxyethyl)amino-2-  
methylaniline, 4-N,N-bis( $\beta$ -hydroxyethyl)amino-2-  
chloroaniline, 2- $\beta$ -hydroxyethyl-para-phenylenediamine,  
2-fluoro-para-phenylenediamine, 2-isopropyl-para-  
phenylenediamine, N-( $\beta$ -hydroxypropyl)-para-  
20 phenylenediamine, 2-hydroxymethyl-para-phenylene-  
diamine, N,N-dimethyl-3-methyl-para-phenylenediamine,  
N,N-(ethyl- $\beta$ -hydroxyethyl)-para-phenylenediamine,  
N-( $\beta,\gamma$ -dihydroxypropyl)-para-phenylenediamine, N-(4'-  
aminophenyl)-para-phenylenediamine, N-phenyl-para-  
25 phenylenediamine, 2- $\beta$ -hydroxyethyloxy-para-  
phenylenediamine, 2- $\beta$ -acetylaminioethyloxy-para-  
phenylenediamine, N-( $\beta$ -methoxyethyl)-para-

phenylenediamine, and their addition salts with an acid.

10. Composition according to Claim 7, characterized in that the double bases are chosen from the compounds of formula (II), and their addition salts with an acid:



in which:

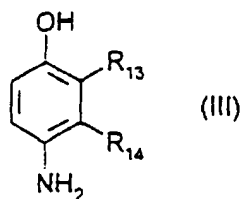
- $\text{Z}_1$  and  $\text{Z}_2$ , which are identical or different, represent a hydroxyl or  $-\text{NH}_2$  radical which may be substituted with a  $\text{C}_1\text{-C}_4$  alkyl radical or with a linking arm Y;
- the linking arm Y represents a linear or branched alkylene chain comprising from 1 to 14 carbon atoms, which may be interrupted by or which may end with one or more nitrogen-containing groups and/or one or more heteroatoms such as oxygen, sulphur or nitrogen atoms, and optionally substituted with one or more hydroxyl or  $\text{C}_1\text{-C}_6$  alkoxy radicals;
- $\text{R}_5$  and  $\text{R}_6$  represent a hydrogen or halogen atom, a  $\text{C}_1\text{-C}_4$  alkyl radical, a monohydroxy( $\text{C}_1\text{-C}_4$  alkyl) radical, a polyhydroxy( $\text{C}_2\text{-C}_4$  alkyl) radical, an amino( $\text{C}_1\text{-C}_4$  alkyl) radical or a linking arm Y;

-  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$  and  $R_{12}$ , which are identical or different, represent a hydrogen atom, a linking arm Y or a  $C_1$ - $C_4$  alkyl radical;

it being understood that the compounds of formula (II) contain only one linking arm Y per molecule.

11. Composition according to Claim 10, characterized in that the double bases of formula (II) are chosen from  $N,N'$ -bis( $\beta$ -hydroxyethyl)- $N,N'$ -bis(4'-aminophenyl)-1,3-diaminopropanol,  $N,N'$ -bis( $\beta$ -hydroxyethyl)- $N,N'$ -bis(4'-aminophenyl)ethylenediamine,  $N,N'$ -bis(4-aminophenyl)tetramethylenediamine,  $N,N'$ -bis( $\beta$ -hydroxyethyl)- $N,N'$ -bis(4-aminophenyl)tetramethylenediamine,  $N,N'$ -bis(4-methylaminophenyl)tetramethylenediamine,  $N,N'$ -bis(ethyl)- $N,N'$ -bis(4'-amino-3'-methylphenyl)ethylenediamine, 1,8-bis(2,5-diaminophenoxy)-3,5-dioxaoctane, and their addition salts with an acid.

12. Composition according to Claim 7, characterized in that the para-aminophenols are chosen from the compounds of formula (III), and their addition salts with an acid:



in which:

-  $R_{13}$  represents a hydrogen or halogen atom, a  $C_1$ - $C_4$  alkyl, monohydroxy( $C_1$ - $C_4$  alkyl), ( $C_1$ - $C_4$ )alkoxy( $C_1$ - $C_4$ )-

alkyl, amino(C<sub>1</sub>-C<sub>4</sub> alkyl) or hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkylamino-(C<sub>1</sub>-C<sub>4</sub> alkyl) radical,

- R<sub>14</sub> represents a hydrogen or halogen atom, a C<sub>1</sub>-C<sub>4</sub> alkyl, monohydroxy(C<sub>1</sub>-C<sub>4</sub> alkyl), polyhydroxy(C<sub>2</sub>-C<sub>4</sub> alkyl), amino(C<sub>1</sub>-C<sub>4</sub> alkyl), cyano(C<sub>1</sub>-C<sub>4</sub> alkyl) or (C<sub>1</sub>-C<sub>4</sub>)alkoxy(C<sub>1</sub>-C<sub>4</sub>)alkyl radical, it being understood that at least one of the radicals R<sub>13</sub> or R<sub>14</sub> represents a hydrogen atom.

13. Composition according to Claim 12,  
 10 characterized in that the para-aminophenols of formula (III) are chosen from para-aminophenol, 4-amino-3-methylphenol, 4-amino-3-fluorophenol, 4-amino-3-hydroxymethylphenol, 4-amino-2-methylphenol, 4-amino-2-hydroxymethylphenol, 4-amino-2-methoxymethylphenol,  
 15 4-amino-2-aminomethylphenol, 4-amino-2-(β-hydroxyethylaminomethyl)phenol, 4-amino-2-fluorophenol, and their addition salts with an acid.

14. Composition according to Claim 7,  
 characterized in that the ortho-aminophenols are chosen  
 20 from 2-aminophenol, 2-amino-5-methylphenol, 2-amino-6-methylphenol, 5-acetamido-2-aminophenol, and their addition salts with an acid.

15. Composition according to Claim 7,  
 characterized in that the heterocyclic bases are chosen  
 25 from pyridine derivatives, pyrimidine derivatives, pyrazole derivatives, pyrazolopyrimidine derivatives, and their addition salts with an acid.

16. Composition according to any one of the preceding claims, characterized in that the oxidation base(s) represent from 0.0005 to 12% by weight of the total weight of the dyeing composition.

5           17. Composition according to Claim 16, characterized in that the oxidation base(s) represent from 0.005 to 6% by weight of the total weight of the dyeing composition.

10           18. Composition according to any one of the preceding claims, characterized in that the 2-amino-4-N-( $\beta$ -hydroxyethyl)aminoanisole and/or the or its addition salts with an acid represent from 0.0001 to 8% by weight of the total weight of the dyeing composition.

15           19. Composition according to Claim 18, characterized in that the 2-amino-4-N-( $\beta$ -hydroxyethyl)aminoanisole and/or the or its addition salts with an acid represent from 0.005 to 5% by weight of the total weight of the dyeing composition.

20           20. Composition according to any one of the preceding claims, characterized in that it contains one or more other couplers different from 2-amino-4-N-( $\beta$ -hydroxyethyl)aminoanisole and/or direct dyes.

25           21. Composition according to any one of the preceding claims, characterized in that the addition salts with an acid are chosen from hydrochlorides, hydrobromides, sulphates and tartrates, lactates and acetates.



22. Composition according to any one of the preceding claims, characterized in that the medium appropriate for dyeing consists of water or of a mixture of water and at least one organic solvent.

5           23. Composition according to any one of the preceding claims, characterized in that it has a pH of between 4 and 11.

24. Method of dyeing keratinous fibres, and in particular human keratinous fibres such as hair,  
10 characterized in that at least one ready-to-use dyeing composition as defined in any one of the preceding claims is applied to the said fibres for a sufficient time to develop the desired colour.

25. Method according to Claim 24,  
15 characterized in that it comprises a preliminary step consisting in storing in a separate form, on the one hand, a composition (A) comprising, in a medium appropriate for dyeing, at least one oxidation base and 2-amino-4-N-( $\beta$ -hydroxyethyl)aminoanisole and/or at  
20 least one of its addition salts with an acid and, on the other hand, a composition (B) containing, in a medium appropriate for dyeing, at least one enzyme of laccase [lacuna], and then in mixing them at the time of use before applying this mixture to the keratinous  
25 fibres.

26. Multicompartment device or dyeing "kit", characterized in that it comprises a first compartment containing the composition (A) as defined in Claim 25

and a second compartment containing the composition (B)  
as defined in Claim 25.